JAPANESE PATENT OFFICE

Patent Application Laid Open

Japanese Patent Kokai 2000-93309

Date of Publication: 4 April 2000

Number of Inventions: Seven

Request for Examination: Not Requested

Nine Pages in the Source Text

International Classification	Recognition Code	FI	Theme Code (Ref.)
A47J 31/24		A47J 31/24	3E047
31/06		31/06	A 4B004
G07F 13/06	103	G07F 13/06	103 4B027
//A23F 5/10		A23F 5/10	
5/36		5/36	

Application No.: Hei 10-270313

Date of Application: 24 September 1998

Applicant: 000001845

Sanden KK

20 Kotobuki-cho, Isezaki City, Gumma Prefecture.

Inventor: Takeshi Sato

c/o Sanden KK, 20 Kotobuki-cho, Isezaki City, Gumma Prefecture.

Agent: 100095245

Patent Attorney Yoshihiko Sakaguchi

F Terms (ref.) 3E047 AA02 BA01 DA02 DA06 DA07

DB09 BC05 EA02 EA07 EC05

EC07

4B004 AA18 AA20 BA36 BA40 BA43

CA08 CA17

1B027 FB24 FQ06 FQ19

Title of the Invention: A Sealed Cartridge of Powdered Drink

Summary

Problem To provide a sealed cartridge of powdered drink that can be stably stowed stacked up in an automatic vending machine.

Means of Solution It is furnished with a vertical tube with a bottom, which is made of material that is impermeable by water and which accommodates the powdered drink in its interior, and a thin film that closes the open end of the vertical tube with a bottom and a thin film that closes an opening formed in the bottom wall of the vertical tube with a bottom.

Scope of Patent Claims

Claim 1 A sealed cartridge of powdered drink characterised in that it is furnished with a vertical tube with a bottom, which is made of material that is impermeable by water and which accommodates the powdered drink in its interior, and a thin film that closes the open end of the vertical tube with a bottom and a thin film that closes an opening formed in the bottom wall of the vertical tube with a bottom.

Claim 2 The sealed cartridge of powdered drink disclosed in Claim 1 characterised in that it is furnished with a column shaft that is set on the bottom of the vertical tube with a bottom and which extends towards the open end of the vertical tube with a bottom and which has a vertical tube on its end part. The end of this vertical tube is in contact with the thin film that closes the open end of the vertical tube with a bottom and openings are formed in the side wall of this vertical tube.

Claim 3 The sealed cartridge of powdered drink disclosed in Claim 2 characterised in that the column shaft is positioned concentric with the vertical tube with a bottom and a plurality of openings are formed in the vertical tube on the end of the column shaft that are equidistant from each other in the circumferential direction.

Claim 4 The sealed cartridge of powdered drink disclosed in Claim 3 characterised in that an opening is formed in the centre of the bottom of the vertical tube with a bottom. A plurality of connecting channels that are equidistant from each other in a circumferential direction are formed in the base of the column shaft and they connect the space inside the vertical tube with a bottom and the opening in the bottom wall.

Claim 5 The sealed cartridge of powdered drink disclosed in any of Claims 1 to 4 characterised in that the vertical tube with a bottom is a vertical cylinder with a bottom.

Claim 6 The sealed cartridge of powdered drink disclosed in any of Claims 1 to 4 characterised in that the tube at the end of the column shaft is a vertical cylinder.

Claim 7 The sealed cartridge of powdered drink disclosed in any of Claims 1 to 6 characterised in that the vertical tube with a bottom and the column shaft are formed as one integral unit.

Detailed Explanation of the Invention

0001

Technical Field to Which the Invention Belongs

This invention relates to a sealed cartridge of powdered drink in which powdered drink for a cupful is sealed. The cartridge is set up in the hot water supply device of the automatic vending machine and a cupful of drink is poured out.

0002

Prior Art

A sealed cartridge of powdered drink in the form of a conical tube in which powdered drink for a cupful is sealed and then the cartridge is set up in a hot water supply device and a cupful of drink is poured out has been presented in Japanese Patent Publication 61-51882. The sealed cartridge of powdered drink in Japanese Patent Publication 61-51882 is set up base downwards in the housing of a hot water supply device. The top of the sealed cartridge of powdered drink is pierced and the hot water nozzle of the hot water supply device is inserted into the sealed cartridge of powdered drink. Hot water is forced into the sealed cartridge of powdered drink and the hot water and the powdered drink in the sealed cartridge of powdered drink are mixed together. The thin film that seals the bottom of the sealed cartridge of powdered drink is ruptured by the internal pressure and the drink inside the sealed cartridge of powdered drink flows out from the said ruptured part.

0003

Problems to Be Overcome by the Invention

In the sealed cartridge of powdered drink in Japanese Patent Publication 61-51882, as the form of it was a conical tube there was the problem that it could not be stably stowed stacked up inside the automatic vending machine. This invention is one that has been made in the light of the said problem and it aims to provide a sealed cartridge of powdered drink that can be stably stowed stacked up in an automatic vending machine.

0004

Means of Overcoming the Problems

In order to overcome the said problems, in this invention a sealed cartridge of powdered drink is provided which is characterised in that it is furnished with a vertical tube with a bottom, which is made of material that is impermeable by water and which accommodates the powdered drink in its interior, and a thin film that closes the open end of the vertical tube with a bottom and a thin film that closes an opening formed in the bottom wall of the vertical tube with a bottom. As the sealed cartridge of powdered drink of this invention is a vertical tube, it can be stably stowed stacked up in an automatic vending machine.

0005 In a desirable form of this invention, the sealed cartridge of powdered drink is furnished with a column shaft which is set on the bottom of the vertical tube with a bottom and which extends towards the open end of the vertical tube with a bottom and which has a vertical tube on its end part. The end of this vertical tube is in contact with the thin film that closes the open end of the vertical tube with a bottom and openings are formed in the side wall of this vertical tube. The thin film that closes the open end of the sealed cartridge of powdered drink is pierced and the hot water supply nozzle of a hot water supply device is inserted into the vertical tube at the end of the column shaft. By pushing the part in the vicinity of the end of the water supply nozzle up against the end surface of the vertical tube, the hot water supply part is sealed. As the extent of the length of the seal part is short, there is little possibility that hot water will leak out from the seal part. In a desirable form of this

invention, the column shaft is positioned concentric with the vertical tube with a bottom and a plurality of openings are formed in the straight tube on the end of the column shaft that are equidistant from each other in the circumferential direction. The hot water coming out from the hot water supply nozzle pours into the sealed cartridge of powdered drink via the plurality of openings formed in the vertical tube at the end of the column shaft. Because the column shaft is located concentric with the vertical tube with a bottom and the openings in the vertical tube are equidistant from each other in the circumferential direction, the hot water is supplied evenly to the powdered drink accommodated in the sealed cartridge of powdered drink. As a result, the mixing time for the hot water and powdered drink is reduced; the vending time for the drink is reduced; and the convenience of the automatic vending machine is improved.

0006 In a desirable form of this invention, an opening is formed in the centre of the bottom wall of the sealed cartridge of powdered drink. A plurality of connecting channels equidistantly separated in a circumferential direction is formed in the base of the column shaft and these channels connect the opening in the bottom wall and the internal space inside the sealed cartridge of powdered drink. The thin film that closes the opening in the bottom of the sealed cartridge of powdered drink is ruptured by a suitable means. The drink inside the sealed cartridge of powdered drink passes through the plurality of connecting channels formed in the base of the column shaft and through the opening formed in the bottom of the sealed cartridge of powdered drink and flows out from the ruptured part of the thin film that had closed the opening. The opening in the bottom of the sealed cartridge of powdered drink and the plurality of connecting channels in the base of the column shaft are formed in the centre of the sealed cartridge of powdered drink. As the connecting channels in the base of the column shaft are formed with a mutually equidistant separation, the drink in the sealed cartridge of powdered drink flows out evenly from the sealed cartridge of powdered drink. As a result, the time taken for the drink to flow out is reduced; the vending time for the drink is reduced; and the convenience of the automatic vending machine is improved. In a desirable form of this invention, the vertical tube with a bottom

is a vertical cylinder with a bottom. A cylinder is easy to hold compared with a polygonal tube and it is easy to handle. As a result, the operation of stowing the sealed cartridge of powdered drink in the automatic vending machine becomes easy and the work of maintenance of the automatic vending machine becomes easy. In a desirable form of this invention, the vertical tube on the end of the column shaft is a vertical cylinder. By inserting the end part of a cylindrical shape hot water supply nozzle into the vertical cylinder a circular seal is formed and by making the seal part circular the extent of the length of the seal part is reduced compared with the case where the seal part is made a polygonal shape and the seal is improved. In a desirable form of this invention, the vertical tube with a bottom and the column shaft are formed as one integral unit. By forming the vertical tube with a bottom and the column shaft as one integral unit the strength of the sealed cartridge of powdered drink is improved.

0007

Form of Embodiment of the Invention

An explanation of the sealed cartridge of powdered drink relating to a practical embodiment of this invention will be given, based on Figs.1 and 2. Sealed cartridge of powdered drink A is furnished with vertical cylinder with a bottom 1. Opening $1a_1$ is formed in the middle of bottom wall 1a of vertical cylinder with a bottom 1. Bottom wall 1a is located a little distance away from the bottom end of vertical cylinder with a bottom 1. Cylinder 2, which surrounds opening $1a_1$, extends downwards from bottom wall 1a. The bottom end of cylinder 2 is located in the same plane as the bottom end of vertical cylinder with a bottom 1. Cylindrical column shaft 3, the top of which is closed, is positioned in the centre of bottom wall 1a. Column shaft 3 extends concentric with vertical cylinder with a bottom 1 in the direction of the top end, which is the open end of vertical cylinder with a bottom 1. Vertical cylinder 4 is integrally formed on the end of column shaft 3. A plurality of openings 4a that are equidistantly separated from each other in the circumferential direction is formed in the side wall of vertical cylinder 4. The top end of vertical cylinder 4 is located in the same plane as the top end of vertical cylinder with a bottom 1. A plurality of

connecting channels 3a is formed in the base of column shaft 3 and the channels are equidistant from each other in the circumferential direction. They connect the opening $1a_1$ in bottom wall 1a and the space inside vertical cylinder with a bottom 1. Vertical cylinder with a bottom 1, cylinder 2, column shaft 3 and vertical cylinder 4 are made as one unit using a material such as polypropylene that is impermeable by water and also causes no problems over food hygiene. The top end of vertical cylinder with a bottom 1, which is the open end, and the top end of vertical cylinder 4 are closed by an aluminium vapour deposition film 5a that is impermeable by air. The bottom end of cylinder 2 and opening $1a_1$ formed in bottom wall 1a of vertical cylinder with a bottom 1 in their turn are closed by aluminium vapour deposition film 5b that is impermeable by air. Aluminium vapour deposition film 5b extends to the bottom of vertical cylinder with a bottom 1. Filter 6, which is made of non-woven fibre cloth that gives no problems with food hygiene such as polypropylene fibre, is positioned immediately above bottom wall 1a of vertical cylinder with a bottom 1. Coffee bean powder 100 is sealed inside vertical cylinder with a bottom 1.

0008 An explanation will be given for an automatic vending machine that dispenses and sells regular coffee using sealed cartridge of powdered drink A. As shown in Figs.3 and 4, the automatic vending machine that dispenses and sells regular coffee using sealed cartridge of powdered drink A is furnished with 2 of the stowage devices B for sealed cartridges of powdered drink, transporting and locating device C for the sealed cartridge of powdered drink and hot water supply device D, which provides hot water to the sealed cartridge of powdered drink.

0009 An explanation based on Figs.5 to 9 will be given for the structure of stowage device B for sealed cartridges of powdered drink. Stowage device B for sealed cartridges of powdered drink is furnished with cartridge columns 10. As shown in Fig.5, cartridge column 10 has stowage tube 11 with an abbreviated horseshoe shape cross section extending from top to bottom and support plates 12 and 13, which are fixed to the top end and bottom end of stowage tube 11. Notch 11a is formed in the circular arc part of the

bottom end of stowage tube 11. The cartridge column, which consists of a plurality of sealed cartridge of powdered drinks A, is stowed in stowage tube 11, stacked up vertically. As sealed cartridges of powdered drinks A are vertical tubes, they are stably stowed stacked up inside stowage tube 11. As sealed cartridges of powdered drinks A are vertical cylinders, they are easier to carry than a many-sided vertical tube and are easier to handle. As a result, the work of stowing sealed cartridges of powdered drinks A in stowage device B becomes easy and maintenance work on the automatic vending machine becomes easy. Top support plate 12 has stop roller 12a, located in the middle of the top surface, and 2 guide rollers 12b, which are located at the side of the top surface. Rollers 12a and 12b are fitted free to rotate, centred on their respective vertical shafts. Lower support plate 13 has stop roller 13a, located in the middle of the bottom surface, 2 guide rollers 13b, which are located at the side of the bottom surface, and 2 travelling rollers 13c, which are located at either end of the bottom surface. Travelling rollers 13c are installed with freedom to rotate centred on their respective horizontal shafts.

0010 The sealed cartridge of powdered drink stowage device B is furnished with cartridge column moving mechanism 20. As shown in Figs.6 to 9, cartridge column moving mechanism 20 is furnished with an upper and lower pair of oval endless guide rails 21, which guide cartridge column 10, and a pair of base plates 22, which are positioned above and below cartridge column 10, and a top and bottom pair of drive levers 23, which move cartridge column 10 along guide rails 21. The pair of base plates 22 are connected to each other by a strut that is not shown in the diagram. Guide rails 21 are fixed to base plates 22. Guide rollers 12b and 13b of cartridge column 10 are engaged in guide rails 21. Travelling rollers 13c of cartridge column 10 are made to move around on bottom base plate 22 while taking the weight of cartridge column 10. Drive levers 23 are fitted with freedom to rotate on base plates 22 and are made so as to rotate in an anticlockwise direction with one end acting as a fulcrum, as shown by the arrow sign in Fig.7, by a means of driving that is not shown in the diagram. When drive levers 23 engaged with stop rollers 12a and 13a of the cartridge column 10 located at one end of the straight line section of guide rails 21 rotate,

pushing the cartridge column 10 to the end of the other straight line section of guide rails 21 via one of the semicircular arc parts of guide rails 21, they separate away stop rollers 12a and 13a of cartridge column 10. As shown in Figs.6 and 7, a plurality of cartridge columns 10 is close together with no space in between them on guide rails 21, except on the said one semicircular arc part. As can be seen from Fig.7, the cartridge column 10 which is engaged in the central part of the other semicircular part of guide rails 21 has the open end of stowage tube 11 turned in a radially outwards direction and notch 11a turned in a radially inwards direction. Every time drive levers 23 make 1 revolution, cartridge columns 10 move 1 place at a time in the anticlockwise direction on Fig.7. As shown in Fig.7, air cylinder 30 is positioned confronting notch 11a of stowage tube 11 of the cartridge column 10 that is engaged in the central part of the other semicircular arc section of guide rails 21. As shown in Figs.3 and 4, gate shaped strut 31 is positioned at the end of lower base plate 22, facing air cylinder 30. Cross beam 31a of strut 31 closely confronts the 2nd from the bottom sealed cartridge of powdered drink A in the cartridge column facing it. In the 2 stowage devices B for sealed cartridges of powdered drink there are stowed sealed cartridges of powdered drinks A which contain types of powdered drink material that are different from each other.

0011 An explanation will be given of the configuration of the transportation and position fixing device C for the sealed cartridges of powdered drink. As shown in Fig.3 and 4, transportation and position fixing device C for the sealed cartridges of powdered drink is furnished with conveyor 41, which has 2 endless belts 40. Conveyor 41 extends close to the central part of the other semicircular arc section of guide rails 21 of the 2 stowage devices B for sealed cartridges of powdered drink. As shown in Fig.3, transportation and position fixing device C for the sealed cartridges of powdered drink is furnished with stopper member 42, positioned on the top of the part close to one end of conveyor 41 and able to make return movements in the up and down direction in relation to conveyor 41. Stopper member 42 is fitted on hot water supply cylinder 54a of hot water supply device D, described later. Microswitch 43 is fitted near the bottom part of stopper member 42.

0012 An explanation will be made of the construction of hot water supply device D, which supplies hot water to sealed cartridge of powdered drink A. As shown in Fig.3, hot water supply device D is furnished with water heater 52, which is connected via valve 50 and pump 51 to the water supply pipe. Pressurised hot water supply device 54 is connected via valve 53 to water heater 52. As shown in Figs.3 and 10, pressurised hot water supply device 54 has hot water supply cylinder 54a and drive piston 54b, which fits into the upper part of hot water supply cylinder 54a, and cylindrical shaped hot water supply nozzle 54c, which is fitted on the bottom of hot water supply cylinder 54a. Non-return valve 54d is positioned in hot water supply nozzle 54c. Conical hot water supply needle 54e is fitted at the bottom of hot water supply nozzle 54c. As shown in Fig.3, hot water supply cylinder 54a is positioned above and near one end of conveyor 41 of transportation and position fixing device C for sealed cartridges of powdered drink. Hot water supply cylinder 54a is supported, able to move up and down, by a spring not shown in the diagram which is fitted to a fixed supporting member not shown in the diagram. There is a drive device, not shown in the diagram, which drives drive piston 54b backwards and forwards in a lengthwise direction. As can be seen from Figs.3 and 10, stopping member 42 of transportation and position fixing device C for sealed cartridges of powdered drink is fitted at the bottom end of hot water supply cylinder 54a. As can be understood from Fig.10, stopping member 42 has an abbreviated semicircular arc shaped cross section. The bottom side part of stopping member 42 curves outwards in the radial direction. The bottom end of stopping member 42 is located lower than the end of hot water supply needle 54e. As shown in Figs.3 and 11, multistage cylindrical film rupturing member 55, which has saw shaped teeth 55a at the top, is situated under hot water supply cylinder 54a and immediately below the top side travelling section of conveyor 41. Part of saw shaped teeth 55a is cut away and U-shaped concavities 55b are formed.

0013 An explanation will be given about an automatic vending machine which dispenses and sells regular coffee using sealed cartridge of powdered drink A. The user inserts money

into a coin slot that is not shown in the diagram. He pushes a product selection button, not shown in the diagram, and the product is selected. Under the control of a control device, not shown in the diagram, air cylinder 30 of stowage device B for sealed cartridges of powdered drink that houses the sealed cartridge of powdered drink A of the product that was selected is operated. As shown by the arrow on Fig.4, the piston of air cylinder 30 advances into notch 11a of stowage tube 11 of the cartridge column 10 in front of it. It impacts from the side on the lowest sealed cartridge of powdered drink A in the cartridge column stowed in stowage tube 11. The said sealed cartridge of powdered drink A is pushed sideways out from cartridge column 10. Sideways movement of the 2nd sealed cartridge of powdered drink A from the bottom is prevented by cross beam 31a of strut 31. As a result, stability of the remaining sealed cartridge of powdered drinks A in the cartridge column is ensured. The lowest sealed cartridge of powdered drink A, which has been pushed sideways, transfers to conveyor 41 of transportation and position fixing device C for sealed cartridges of powdered drink in front of it. After the lowest sealed cartridge of powdered drink A has been pushed sideways, all the remainder of the cartridge column drops down one place in unison. When the sealed cartridges of powdered drinks A in cartridge column 10 in front of air cylinder 30 are sold out, drive levers 23 rotate and the adjacent column in which sealed cartridges of powdered drinks A are accommodated moves into position in front of air cylinder 30.

0014 After the operation of air cylinder 30 has been completed, conveyor 41 of transportation and position fixing device C for sealed cartridges of powdered drink operates. The sealed cartridge of powdered drink A that was transferred to conveyor 41 moves in the direction of hot water supply device D, as shown by the arrow in Fig.4.

0015 Simultaneously with the operation of air cylinder 30 of sealed cartridge of powdered drink stowage device B, hot water supply device D operates. At the point in time that the user inserts coins into the coin slot, not shown in the diagram, and pushes the product selection button, not shown in the diagram, drive piston 54b of pressurised water supply

device 54 is in the stand-by position above hot water supply cylinder 54, as shown in Fig.12(a). Hot water cylinder 54 is also in the stand-by position under the force of a spring, not shown in the diagram. Stopper member 42 fitted to hot water supply cylinder 54 is above the top of sealed cartridge of powdered drink A carried on conveyor 41. Hot water 200 is supplied from water heater 52 to hot water supply cylinder 54a of pressurised hot water supply device 54, which is in the state shown in Fig.12(a).

0016 Simultaneously with the operation of conveyor 41 of transportation and position fixing device C for sealed cartridges of powdered drink, drive piston 54b of pressurised water supply device 54 descends and fits into hot water supply cylinder 54a, as shown in Fig.12(b). Pushed by drive piston 54b, hot water supply cylinder 54a descends slightly. As a result, stopper member 42, which was above the top of sealed cartridge of powdered drink A in the state where it was carried on conveyor 41, as shown in Fig.12(a), descends to a position of such a height that it can engage with sealed cartridge of powdered drink A in the state where it is carried on conveyor 41, as shown in Fig.12(b). At this time, hot water supply needle 54e is higher than the top of sealed cartridge of powdered drink A in the state where it is carried on conveyor 41. The sealed cartridge of powdered drink A carried on conveyor 41 arrives in a position directly underneath pressurised water supply device 54. As shown in Figs.4 and 12(b), vertical cylinder with a bottom 1 of sealed cartridge of powdered drink A engages with stopper member 42 and sealed cartridge of powdered drink A stops. Through vertical cylinder with a bottom 1 engaging with stopper member 42, sealed cartridge of powdered drink A is fixed in its position with respect to pressurised water supply device 54, more precisely, with respect to hot water supply needle 54e. The engagement of vertical cylinder with a bottom 1 of sealed cartridge of powdered drink A with stopper member 42 is detected by microswitch 43 and conveyor 41 stops.

0017 Drive piston 54b descends further. As shown in Fig.12(c) and 13, the tip of hot water supply needle 54e breaks through aluminium vapour deposition film 5a of sealed cartridge of powdered drink A and penetrates into vertical cylinder 4. The flange part of hot water

supply needle 54e presses up against the top of vertical cylinder 4. The hot water supply section is sealed through the flange part of hot water supply needle 54e pressing up against the top of vertical cylinder 4. As vertical cylinder 4 has a small diameter and the extension length of the seal part is short, the possibility of hot water leaking out from the seal part is low. The seal part formed by the flange part of hot water supply needle 54e pressing against the top of vertical cylinder 4 is circular. A circular seal has a shorter extension in length than a polygonal seal and the seal is good. The sealed cartridge of powdered drink A is pushed downwards by hot water supply needle 54e and the top side travelling section of conveyor 41 directly underneath sealed cartridge of powdered drink A is bent down. The sealed cartridge of powdered drink A descends slightly. Cylinder 2 of sealed cartridge of powdered drink A goes into the ring of teeth 55a of film rupturing member 55 and aluminium vapour deposition film 5b is ruptured by teeth 55a. As the part facing concave parts 55b is not ruptured, there is no concern about the part ruptured by teeth 55a separating from the remainder. As column shaft 3 and vertical cylinder 1 of sealed cartridge of powdered drink A are formed as one unit, the strength of sealed cartridge of powdered drink A is high. Consequently, sealed cartridge of powdered drink A is not deformed even when pushed down by hot water supply needle 54e and there is no problem in extracting the regular coffee.

0018 Drive piston 54b descends a little further for a very short time. As shown in Fig.12(d), the air inside hot water supply cylinder 54 is compressed and hot water 200 is compressed. Non-return valve 54d opens. As shown by the arrows in Fig.13, a small amount of hot water passes through hot water supply nozzle 54c and hot water supply needle 54e and flows into vertical cylinder 4 of sealed cartridge of powdered drink A. The small amount of hot water that has flowed into vertical cylinder 4 passes through openings 4a in vertical cylinder 4 and flows into the interior space of vertical cylinder with a bottom 1. The small amount of hot water percolates into coffee bean powder 100 in vertical cylinder with a bottom 1.

0019 Drive piston 54b ascends a little. As shown in Fig.14(a), non-return valve 54d closes. Coffee bean powder 100 in vertical cylinder with a bottom 1 is steamed by the small amount of hot water that has percolated in.

0020 Drive piston 54b descends. As shown in Fig.14(b), hot water 200 inside hot water supply cylinder 54a is all expressed and flows into vertical cylinder 4 of sealed cartridge of powdered drink A. As shown by the arrows in Fig.13, hot water passes through openings 4a in vertical cylinder 4, flows into the space inside vertical cylinder with a bottom 1 and percolates into coffee beans 100 in vertical cylinder with a bottom 1. Regular coffee is extracted because of the hot water going down into coffee bean powder 100. As column shaft 3 to which vertical cylinder 4 is fitted is positioned concentric with vertical cylinder with a bottom 1 and openings 4a in vertical cylinder 4 are formed equidistant from each other in the circumferential direction, hot water is supplied evenly to coffee bean powder 100 accommodated in vertical cylinder with a bottom 1. As a result, the mixing time for the hot water and coffee bean powder 100 is reduced, the vending time for regular coffee is reduced and the convenience of the automatic vending machine is improved. The regular coffee extracted passes through filter 6 and, as shown by the arrow signs in Fig.13, it passes through connecting channels 3a formed in the base of column shaft 3. It then passes through opening $1a_1$ formed in bottom wall 1a of vertical cylinder with a bottom 1 and flows out from sealed cartridge of powdered drink A. The regular coffee passes through multistage cylindrical film rupturing member 55 and flows into a paper cup, not shown in the diagram, that is placed underneath. As opening $1a_1$ in bottom wall 1a of vertical tube with a bottom 1 and the plurality of connecting channels 3a in the base of column shaft 3 are formed in the centre of vertical cylinder with a bottom 1 and as the plurality of connecting channels 3a in the base of column shaft 3 are formed with an equal separation distance in the circumferential direction, the regular coffee in vertical cylinder with a bottom 1 flows out evenly from vertical cylinder with a bottom 1. As a result, the time taken for the regular coffee to come out is reduced, the vending time for the regular coffee is reduced and the convenience of the automatic vending machine is improved.

0021 Drive piston 54b again descends. As shown in Fig.14(c), the air inside hot water supply cylinder 54a is compressed and all the remaining hot water inside hot water supply needle 54e is expressed and flows into sealed cartridge of powdered drink A. All the regular coffee remaining inside sealed cartridge of powdered drink A is expressed and flows into the paper cup, not shown in the diagram, placed underneath.

0022 Drive piston 54b rises to the stand-by position. Under the force of a spring, not shown in the diagram, hot water supply cylinder 54a rises to the stand-by position, as shown in Fig.14(d). Hot water supply needle 54e separates from vertical cylinder 4 of sealed cartridge of powdered drink A and stopper member 42 separates away from vertical cylinder with a bottom 1 of sealed cartridge of powdered drink A. Conveyor 41 of transportation and position fixing device C for sealed cartridges of powdered drink operates and, as shown in Fig.3, the used sealed cartridge of powdered drink A falls from the end of conveyor 41 and is collected in waste box 300 that is placed underneath conveyor 41.

0023 Sugar, milk and suchlike are supplied from supply devices not shown in the diagrams to the paper cup filled with regular coffee in accordance with the wishes of the user. The user takes the paper cup full of regular coffee out through a removal port not shown in the diagram.

0024 In the practical embodiment described above, coffee bean powder was sealed in sealed cartridge of powdered drink A but sealed cartridge of powdered drink A may be filled with other powdered drinks such as powdered cocoa, powdered soup or powdered tea. Any known extrusion device may be used in place of air cylinder 30.

0025

Effect of the Invention

As has been explained above, as sealed cartridge of powdered drink A relating to this invention is a vertical cylinder, it can be stably stowed stacked up in an automatic vending machine.

Brief Explanation of the Diagrams

Fig.1 is a cross section of the sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Fig.2 is an oblique view of the column shaft of the sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Fig.3 is a partial side view in cross section of part of the automatic vending machine that dispenses and sells regular coffee using a sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Fig.4 is a partial plan view showing in cross section part of the automatic vending machine that dispenses and sells regular coffee using a sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Fig.5 is a side view of a cartridge column in the stowage device for sealed cartridges of powdered drink of the automatic vending machine that dispenses and sells regular coffee using the sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Fig.6 is a side view showing a cross section of part of the stowage device for sealed cartridges of powdered drink of an automatic vending machine that dispenses and sells regular coffee using a sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Fig.7 is a plan view showing a part in cross section looking down on the bottom guide rails of the stowage device for sealed cartridges of powdered drink of an automatic vending machine that dispenses and sells regular coffee using a sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Fig.8 is an expanded view of the main part of a cartridge column of the stowage device for sealed cartridges of powdered drink of an automatic vending machine that dispenses and sells regular coffee using a sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Fig.9 is an expanded view of the main part of a cartridge column of the stowage device for sealed cartridges of powdered drink of an automatic vending machine that dispenses and sells regular coffee using a sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Fig.10 is a diagram showing the construction of the pressurised hot water supply device of an automatic vending machine that dispenses and sells regular coffee using a sealed cartridge of powdered drink relating to a practical embodiment of this invention.

(a) is a cross section and (b) and (c) are oblique views.

Fig.11 is an oblique view of the film rupturing member of the pressurised hot water supply device of an automatic vending machine that dispenses and sells regular coffee using a sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Fig.12 is a cross section of the pressurised hot water supply device showing the operation of the pressurised hot water supply device of an automatic vending machine that dispenses and sells regular coffee using a sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Fig.13 is a cross section of the pressurised hot water supply device showing the operation of the pressurised hot water supply device of an automatic vending machine that dispenses and sells regular coffee using a sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Fig.14 is a cross section of the pressurised hot water supply device showing the operation of the pressurised hot water supply device of an automatic vending machine that dispenses and sells regular coffee using a sealed cartridge of powdered drink relating to a practical embodiment of this invention.

Explanation of the Symbols

A	sealed cartridge of powdered drink
B	stowage device for sealed cartridges of powdered drink
C	transportation and position fixing device for sealed cartridges of powdered drink
D	hot water supply device that supplies hot water to the powdered drink sealed cartridge
1	vertical cylinder with a bottom 1
3	column shaft
4	vertical cylinder
5a, 5b	aluminium vapour deposition film
6	filter
10	cartridge column
21	guide rail
30	air cylinder
41	conveyor
52	water heater
54	pressurised hot water supply device
54a	hot water supply cylinder
54b	drive piston
54c	hot water supply nozzle
54d	non-return valve
54e	hot water supply needle
55	film rupturing member
100	coffee bean powder
200	hot water